

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, of claims in the
application:

LISTING OF CLAIMS

- 1 1. (Original) A method for marking one or more packets of data in a packet-switched
2 network based on achieved flow bandwidth information within the network,
3 comprising the computer-implemented steps of:
4 marking a first group of one or more packets of a data flow with a first behavioral
5 treatment value, wherein the first behavioral treatment value directs devices
6 within the network to treat the first group of one or more packets with a first
7 quality of service treatment;
8 determining an achieved flow bandwidth for the data flow based on data traffic within
9 the network;
10 determining a second behavioral treatment value based on the achieved flow
11 bandwidth within the network; and
12 marking a second group of one or more packets of said data flow with said second
13 behavioral treatment value, wherein the second behavioral treatment value
14 directs devices within the network to treat the second group of one or more
15 packets with a second quality of service treatment.

- 1 2. (Original) The method as recited in Claim 1, wherein:
2 the step of marking a first group of one or more packets includes the step of storing a
3 first differentiated services codepoint (DSCP) value in each header of the first
4 group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and

7 the step of marking a second group of one or more packets includes the step of storing
8 the second DSCP value in each header of the second group of one or more
9 packets of a data flow.

1 3. (Original) The method as recited in Claim 1, further comprising the steps of:
2 determining packet flow characteristics of the first group of one or more packets of a
3 data flow; and
4 determining the second behavioral treatment value based on the available bandwidth
5 within the network and the packet flow characteristics of the first group of one
6 or more packets of a data flow.

A 1 4. (Original) The method as recited in Claim 1, further comprising the steps of:
2 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
3 treatment for forwarding packets within a flow in said network; and
4 generating the first behavioral treatment value based on the established QoS policy.

1 5. (Original) A computer-readable medium carrying one or more sequences of
2 instructions for marking one or more packets of data in a packet-switched network
3 based on achieved flow bandwidth information within the network, wherein execution
4 of the one or more sequences of instructions by one or more processors causes the one
5 or more processors to perform the steps of:
6 marking a first group of one or more packets of a data flow with a first behavioral
7 treatment value, wherein the first behavioral treatment value directs devices
8 within the network to treat the first group of one or more packets with a first
9 quality of service treatment;
10 determining an achieved flow bandwidth for the data flow based on data traffic within
11 the network;
12 determining a second behavioral treatment value based on the achieved flow
13 bandwidth within the network; and

14 marking a second group of one or more packets of said data flow with said second
15 behavioral treatment value, wherein the second behavioral treatment value
16 directs devices within the network to treat the second group of one or more
17 packets with a second quality of service treatment.

A/ 1 6. (Original) The computer-readable medium as recited in Claim 5, wherein:
2 the step of marking a first group of one or more packets includes the step of storing a
3 first differentiated services codepoint (DSCP) value in each header of the first
4 group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and
7 the step of marking a second group of one or more packets includes the step of storing
8 the second DSCP value in each header of the second group of one or more
9 packets of a data flow.

1 7. (Original) The computer-readable medium as recited in Claim 5, further comprising
2 instructions for performing the steps of:
3 determining packet flow characteristics of the first group of one or more packets of a
4 data flow; and
5 determining the second behavioral treatment value based on the available bandwidth
6 within the network and the packet flow characteristics of the first group of one
7 or more packets of a data flow.

1 8. (Original) The computer-readable medium as recited in Claim 5, further comprising
2 instructions for performing the steps of:
3 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
4 treatment for forwarding packets within a flow in said network; and
5 generating the first behavioral treatment value based on the established QoS policy.

1 9. (Original) A computer apparatus comprising:
2 a processor; and

3 a memory coupled to the processor, the memory containing one or more sequences of
4 instructions for marking one or more packets of data in a packet-switched
5 network based on achieved flow bandwidth information within the network,
6 wherein execution of the one or more sequences of instructions by the
7 processor causes the processor to perform the steps of:
8 marking a first group of one or more packets of a data flow with a first
9 behavioral treatment value, wherein the first behavioral treatment value
10 directs devices within the network to treat the first group of one or more
11 packets with a first quality of service treatment;
12 determining an achieved flow bandwidth for the data flow based on data
13 traffic within the network;
14 determining a second behavioral treatment value based on the achieved flow
15 bandwidth within the network; and
16 marking a second group of one or more packets of said data flow with said
17 second behavioral treatment value, wherein the second behavioral
18 treatment value directs devices within the network to treat the second
19 group of one or more packets with a second quality of service treatment.

1 10. (Original) The computer apparatus as recited in Claim 9, wherein:
2 the step of marking a first group of one or more packets includes the step of storing a
3 first differentiated services codepoint (DSCP) value in each header of the first
4 group of one or more packets of a data flow;
5 the step of determining a second behavioral treatment value includes the step of
6 determining a second DSCP value; and
7 the step of marking a second group of one or more packets includes the step of storing
8 the second DSCP value in each header of the second group of one or more
9 packets of a data flow.

1 11. (Original) The computer apparatus as recited in Claim 9, further comprising
2 instructions for performing the steps of:

3 determining packet flow characteristics of the first group of one or more packets of a
4 data flow; and
5 determining the second behavioral treatment value based on the available bandwidth
6 within the network and the packet flow characteristics of the first group of one
7 or more packets of a data flow.

1 12. (Original) The computer apparatus as recited in Claim 9, further comprising
2 instructions for performing the steps of:
3 establishing a Quality of Service (QoS) policy for applying a per-hop-behavior
4 treatment for forwarding packets within a flow in said network; and
5 generating the first behavioral treatment value based on the established QoS policy.

A/ 1 13. (Original) network device configured for marking one or more packets of data in a
2 packet-switched network based on achieved flow bandwidth information within the
3 network, comprising:
4 means for marking a first group of one or more packets of a data flow with a first
5 behavioral treatment value, wherein the first behavioral treatment value directs
6 devices within the network to treat the first group of one or more packets with
7 a first quality of service treatment;
8 means for determining an achieved flow bandwidth for the data flow based on data
9 traffic within the network;
10 means for determining a second behavioral treatment value based on the achieved
11 flow bandwidth within the network; and
12 means for marking a second group of one or more packets of said data flow with said
13 second behavioral treatment value, wherein the second behavioral treatment
14 value directs devices within the network to treat the second group of one or
15 more packets with a second quality of service treatment.

1 14. (Original) A method for marking one or more packets of data in a packet-switched
2 network based on achieved flow bandwidth information within the network,
3 comprising the computer-implemented steps of:
4 causing one or more network devices to mark a first group of one or more packets of a
5 data flow with a first behavioral treatment value, wherein the first behavioral
6 treatment value directs devices within the network to treat the first group of
7 one or more packets with a first quality of service treatment;
8 determining an achieved flow bandwidth for the data flow based on data traffic within
9 the network;
10 determining a second behavioral treatment value based on the achieved flow
11 bandwidth within the network; and
12 causing one or more network devices to mark a second group of one or more packets
13 of said data flow with said second behavioral treatment value, wherein the
14 second behavioral treatment value directs devices within the network to treat
15 the second group of one or more packets with a second quality of service
16 treatment.

1 15. (New) The method as in claim 1, wherein the first behavioral treatment is determined
2 without regard to the achieved flow bandwidth.

1 16. (New) The method as in claim 1, wherein the second behavioral treatment is a
2 behavioral treatment that provides a lower level of service than other available
3 choices of behavioral treatments; and
4 wherein the second behavioral treatment provides a high enough level of service to
5 accommodate the achieved flow bandwidth.

1 17. (New) The method as in claim 1, wherein the second behavioral treatment is a
2 behavioral treatment that provides a minimum level of service that is a sufficient level
3 of service to accommodate the achieved flow bandwidth.

1 18. (New) The method as in claim 1, wherein the step of marking the first group is
2 performed by at least communicating the first behavioral treatment to a differentiated
3 services node located at a border of a differentiated services domain; and
4 wherein the step of marking the second group is performed by at least communicating
5 the second behavioral treatment to the differentiated services node.

1 19. (New) A method as in claim 1, further comprising repeating the step of determining
2 the achieved flow bandwidth and steps that follow the step of determining the
3 achieved flow bandwidth.

1 20. (New) A method as in claim 1, further comprising repeating the step of determining
2 the achieved flow bandwidth and steps that follow the step of determining the
3 achieved flow bandwidth multiple times, therein enhancing efficiency of the network
4 on an on going basis.

1 21. (New) The method as in claim 1, where the step of determining the achieved flow
2 bandwidth is performed by at least estimating the achieved flow bandwidth based on
3 Management Information Base (MIB) variables.

1 22. (New) The method as in claim 1, where the step of determining the achieved flow
2 bandwidth is performed by at least checking a Transfer Control Protocol/ Internet
3 Protocol (TCP/IP) window size and determining a value for the achieved flow
4 bandwidth based on the TCP/IP window size.

1 23. (New) The method as in claim 1, wherein the step of determining the achieved flow
2 bandwidth is based on reception quality feedback from a Real-Time Transport
3 Protocol (RTP) receiver.

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- 1 24. (New) A method for marking one or more packets of data in a packet-switched
2 network based on achieved flow bandwidth information within the network,
3 comprising the computer-implemented steps of:
4 marking a first group of packets of a plurality of data flows with an initial set of
5 behavioral treatment values, wherein the first set of behavioral treatment
6 values direct devices within the network to treat the first group packets with an
7 initial set of quality of service treatments;
8 determining achieved flow bandwidths, wherein an achieved flow bandwidth is
9 determined for each of the plurality of data flows based on data traffic within
10 the network;
11 determining an updated set of behavioral treatment values based on the achieved flow
12 bandwidths within the network; and
13 after the steps of marking the first group and determining the updated set of
14 behavioral treatment values, marking a second group packets of said plurality
15 of data flows with said updated set of behavioral treatment values, wherein the
16 updated set of behavioral treatment values direct devices within the network to
17 treat the second group of packets with an updated set of quality of service
18 treatments.
- 1 25. (New) A method for performing packet marking comprising the computer-
2 implemented steps of:
3 defining an initial set of Quality of Service (QoS) values for coloring packets within a
4 plurality of data flows, wherein each of the QoS values indicates an allocation
5 of bandwidth;
6 coloring a first group of one or more packets of a given data flow selected from the
7 plurality of data flows, without regard to an achieved flow bandwidth, by at
8 least

9 communicating the initial set of QoS values to each of one or more edge
10 differentiated services domain nodes that are located at one or more
11 edges of a differentiated services domain, and
12 the one or more edge differentiated services domain nodes using one or more
13 of the initial set of QoS values to color the first group;
14 estimating traffic bandwidth within the network based on bandwidth information
15 corresponding to a current traffic pattern of the network, wherein the traffic
16 bandwidth estimated includes an achieved flow bandwidth for the given data
17 flow;
18 determining an updated set of QoS values for coloring packets within the plurality of
19 data flows, based on the traffic bandwidth estimated,
20 wherein the updated set of QoS values provide lower levels of service than
21 other available choices of QoS values, and
22 wherein the updated set of QoS values provide a high enough level of service
23 to accommodate the traffic bandwidth estimated;
24 coloring a subsequent group of one or more packets of the given data flow with the
25 one or more of updated set of QoS values by at least
26 communicating the updated set of QoS values to each of one or more edge
27 differentiated services domain nodes, and
28 the one or more edge differentiated services domain nodes using one or more
29 of the updated set of QoS values to color the subsequent group;
30 repeating the steps of estimating traffic bandwidth, determining an updated set of
31 QoS values, and coloring a subsequent group multiple time, therein tuning the
32 network on an ongoing basis.

- 1 26. (New) The method as in claim 24, wherein the initial set of QoS values is an initial
2 set of Differentiated Services Codepoint (DSCP) values;
3 wherein the updated set of QoS values is an updated set of DSCP values;
4 wherein the step of estimating traffic bandwidth further comprises the steps of:
5 defining one or more QoS policies that specify target bandwidth values and a
6 range of possible services for each the plurality of data flows, wherein

A' 7 a given target bandwidth value is specified for the given data flow, and
8 wherein the given target bandwidth identifies a specific bandwidth that
9 is desirous or required by the given data flow;
10 gathering information about the traffic bandwidth; and
11 determining the traffic bandwidth based on the information gathered.
